

**WHAT IS CLAIMED IS:**

1. A transfer mechanism between a first vessel containing a slurry of liquid and solids and a second vessel with at least one of said first and second vessels being under a protective atmosphere and/or vacuum, comprising a housing in communication with said first and said second vessels, a screw having at least one helical thread along a longitudinal shank within said housing for transferring material from said first vessel to said second vessel, said screw and said housing cooperating to compress the slurry, whereby slurry entering said housing from said first vessel has the solids therein concentrated as the slurry is transported by said screw toward said second vessel while liquid is expressed from the slurry as the solids are concentrated until the concentrated solids form a plug isolating said second vessel from said first vessel while solids discharge into said second vessel.

2. The transfer mechanism of claim 1, wherein the volume between adjacent screw threads and said housing diminishes between said first and said second vessels.

3. The transfer mechanism of claim 1, wherein said screw is a variable pitch screw.

4. The transfer mechanism of claim 1, wherein said screw is a progressive pitch screw with the smallest pitch being nearest said second vessel.

5. The transfer mechanism of claim 1, wherein said housing is generally cylindrical.

6. The transfer mechanism of claim 1, wherein said housing is conical with the smallest end being nearest said second vessel.

7. The transfer mechanism of claim 1, wherein said housing has an inlet with a first diameter and an outlet with a second diameter near said second vessel, said outlet being smaller than said inlet.

8. The transfer mechanism of claim 1, wherein said housing is cylindrical having the end in communication with said second vessel restricting flow of concentrated solids from said housing to said second vessel.

9. The transfer mechanism of claim 1, wherein said housing near said second vessel has a restriction therein.

10. The transfer mechanism of claim 9, wherein the restriction in said housing is an apertured plate in the end of said housing in communication with said second vessel.

11. The transfer mechanism of claim 1, wherein said housing is cylindrical and said screw is a progressive pitch screw with the smallest pitch being nearest said second vessel.

12. The transfer mechanism of claim 1, wherein said housing is conical with the smallest end being nearest said second vessel and said screw has threads of constant pitch.

13. The transfer mechanism of claim 1, wherein said shank has an increasing diameter toward said second vessel.

14. The transfer mechanism of claim 1, wherein at least a part of said housing in communication with said first vessel has a plurality of apertures therein.

15. The transfer mechanism of claim 14, wherein the plurality of apertures is a mesh.

16. The transfer mechanism of claim 1, and further comprising an outlet in said housing for separating liquid expressed from the slurry from the concentrated solids.

17. A transfer mechanism between a first vessel containing a slurry of liquid alkali or alkaline earth metal or mixtures thereof and metal or alloy or ceramic particles and halide salt particles and a second vessel with at least one of said first and second vessels having a protective atmosphere and/or vacuum therein, comprising a housing in communication with said first and said second vessels, a screw having at least one helical thread along a longitudinal shank within said housing for transferring material from said first vessel to said second vessel, said screw and said housing cooperating to increase the concentration of solids in the slurry between said first and said second vessels until the concentrated particles form a plug isolating said second vessel and the protective atmosphere or vacuum therein from said first vessel and the protective atmosphere or vacuum therein while solids discharge into said second vessel.

18. The transfer mechanism of claim 17, wherein said screw is a progressive pitch screw with the smallest pitch being nearest said second vessel.

19. The transfer mechanism of claim 17, wherein said housing is generally cylindrical.

20. The transfer mechanism of claim 17, wherein said housing is conical with the smallest end being nearest said second vessel.

21. The transfer mechanism of claim 17, wherein said housing is cylindrical and said screw is a progressive pitch screw with the smallest pitch being nearest said second vessel.

22. The transfer mechanism of claim 17, wherein said housing is conical with the smallest end being nearest said second vessel and said screw has threads of constant pitch.

23. The transfer mechanism of claim 17, wherein said shank has an increasing diameter toward said second vessel.

24. The transfer mechanism of claim 17, wherein at least a part of said housing in liquid communication with said first vessel has a plurality of apertures therein.

25. The transfer mechanism of claim 24, wherein the plurality of apertures is a mesh.

26. The transfer mechanism of claim 17, and further comprising an outlet in said housing for separating liquid from the solids in the slurry.

27. The transfer mechanism of claim 26, wherein a double wall housing is provided wherein the inner wall has a portion thereof apertured and a portion thereof solid and the outer wall has said outlet therein, said screw being positioned within said inner wall.

28. The transfer mechanism of claim 17, wherein said housing is cylindrical having the end in communication with said second vessel restricting flow of concentrated solids from said housing to said second vessel.

29. The transfer mechanism of claim 17, wherein said housing near said second vessel has a restriction therein.

30. The transfer mechanism of claim 29, wherein the restriction in said housing is an apertured plate at or near the end of said housing in communication with said second vessel.

31. A method of concentrating and transferring a slurry of a liquid and solids from one container to another while isolating the environments within said containers from each other, comprising providing communication between the containers, transporting slurry from one container toward another container while expressing liquid from the slurry thereby increasing the solids concentration thereof until a plug is formed between two containers isolating the containers while solids from the plug are transferred to the another container.

32. The method of claim 31, wherein at least one container is operated under an inert atmosphere.

33. The method of claim 31, wherein at least one container is operated under vacuum.

34. The method of claim 31, wherein the slurry contains liquid metal and metal particles.

35. The method of claim 34, wherein the slurry contains liquid alkali or alkaline earth metal.

36. The method of claim 34, wherein slurry contains liquid sodium metal and particles of Ti or an alloy thereof.